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Volatility dynamics of stock returns, liquidity and exchange rates in ASEAN Countries

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C H R O N I C L E

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A B S T R A C T

In this study, we examined the volatility trend of stock return in eight ASEAN stock markets. These includes the Singapore Exchange (SGX), Bursa Malaysia Stock Exchange (YSX), the Stock Exchange of Thailand (SET), Indonesia stock exchange, the Vietnam Stock Exchange (VNX), the Cambodia Securities Exchange (CSX), the Lao Securities Exchange (LSX), and the Philippine Stock Exchange. Secondly, we evaluated the factors that influence the level of return in those stock markets with exchange rate volatility as a control variable. By employing FIGARCH-DCC and ARDL models, the study aimed to provide a more robust understanding of stock market dynamics. The findings reveal significant negative returns effect of market volatilities and liquidity crisis in all the stock exchanges of all sample countries in the study. In Singapore, money supply variation, market volatility, liquidity risks, and exchange rate volatility significantly influenced stock returns positively. The short-run model explains 52.26% of the variation in stock returns. Only in Malaysia, we had significant positive returns from exchange rate volatility. Nevertheless, the Russian model explains just 22.22% of the variation in stock returns. In Thailand and Indonesia alike, returns significantly and positively responded to variation in money supply, while the volatility in the market and currency rate exchange adversely impacted returns. The short-run models explain 53.66% and 65.21% of the variation in stock returns for Vietnam and Indonesia, respectively. The variation in money supply does not significantly affect stock returns and has no significant contribution to returns in Cambodia. The Cambodia model explains around 48.34% of the variation in returns. For Lao Stock Exchange, return effects of liquidity risk, and exchange rate instability were significant and negative. Market volatility had insignificantly impacted stock returns in Nigeria. The Lao model explains 50.38% of the variation in stock returns. In the Philippine Stock Exchange, the returns effect of exchange rate volatility and liquidity crisis are adverse and significant. Money supply variation and market volatility had insignificant influence on returns. The model explains 68.11% of the variation in returns. In the Philippines, market volatility, liquidity risks, and exchange rate volatility adversely impacted returns. Money supply variation had no such significant influence on returns. The panel model of the Philippines explains 62.9% of the variation in stock returns. The research accentuates the need for governments to stabilize exchange rates, boost liquidity, through targeted policies aimed at managing stock market dynamics especially as it relates to stock volatility in order to foster meaningful growth and development of the financial market.

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1. Introduction

Stock market volatility, often measured by standard deviation or variance, reflects the magnitude of price swings in a market. Higher volatility indicates greater uncertainty and risk, as prices can experience rapid and unpredictable fluctuations. This can dampen investor confidence, lead to reduced investment activity, and Liquidity risk arises from the difficulty or inability to buy or sell an asset at a fair price and promptly. Dimitris *et al*. (2024) contend that while wealth shocks lead to an increase in stockholding, individual's degrees of risk aversion vary greatly. Conversely, a highly liquid market, like the S&P 500,

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allows investors to readily enter and exit positions with minimal price impact. Conversely, illiquid markets can become volatile at the slightest buying or selling pressure, exacerbating risks and hindering investors. A fundamental component of stock exchange trading is determining the factors that influence the stock exchange (Defrizal *et al*. 2021). The study by Masahiro & Takatoshi (2022) demonstrated the direct influence of liquidity on price discovery, revealing how illiquid markets suffer from distorted pricing and inefficiency and why exchange rate volatility concerns the fluctuation in the value of one currency against another (Yang, & Peng, 2024; Mexmonov, 2020). The Asian currency crisis, floating exchange rate, and financial market reforms caused the motivation to determine the nexus between these two markets (Deng, 2024). This study delves into the complex interplay between stock market volatility, liquidity risk, and their impact on stock returns while accounting for the potential moderating effect of exchange rate volatility. This study tries to ascertain the actual impact of stock market volatility and liquidity risk on stock returns, with exchange rate volatility as a control variable across the countries covered by the study.

Similarly, liquidity risk, a fundamental facet of financial risk management, revolves around an entity's capacity to meet short-term financial obligations without incurring excessive costs (Effiong & Ejabu, 2020). Components include asset liquidity, funding challenges, market conditions, and operational inefficiencies. Managing this risk is vital for businesses and financial institutions. Stress testing helps identify vulnerabilities, while diversified funding reduces reliance on a single source. Adequate reserves act as a buffer, and contingency plans address unforeseen liquidity shortfalls. Regulatory compliance ensures adherence to standards, and ongoing monitoring facilitates prompt identification of emerging risks. Effectively managing liquidity risk enhances financial resilience, maintains market confidence, and fortifies entities against economic uncertainties. Volatility and risk are inherent aspects, with investors typically seeking higher returns for assuming greater risks. Stock returns, the gains or losses on investments in the stock market, are pivotal for assessing performance. Ultimately, stock returns serve as a barometer of investment success, guiding investors in navigating the dynamic landscape of the stock market.

In this study, we examined the volatility trend of stock returns in eight emerging stock markets: Singapore, Malaysia, Thailand (SET), Indonesia, Vietnam, Cambodia Securities, Burma, and the Philippines. Also, we estimate the impact of stock market volatility and liquidity risk on stock returns with exchange rate volatility as a control variable. The study is significant to managers of companies listed on the security exchange of the various countries covered. Investors analyze both short-term and long-term returns, with the latter reflecting fundamental factors. Hence, understanding the correlation between economic factors and stock returns is crucial for strategic decision-making. The research findings equip investors with strategies to protect the performance of their businesses. The study contributes to the literature by offering insights into the complex interactions shaping stock market performance in diverse economic contexts. The significance of this study extends to offering practical implications for investors, policymakers, and financial authorities by providing findings on the intricate dynamics within financial markets. Understanding the dynamic relationships between stock market volatility, liquidity risk, exchange rate fluctuations, and their cumulative impact on stock returns will equip investors with valuable insights for navigating the often-turbulent waters of the financial landscape. To this extent, this study makes use of control variation measured in terms of exchange rate volatility to offer a more precise prediction of the returns on the basis of volatility and liquidity risk.

Finally, this study includes money supply variation as an additional control variable in analyzing stock market dynamics in ASEAN countries. This guarantees an exact relationship and avoids unbiased results. Hence, the study renders informed policy recommendations for all participants in each stock market covered by the study. The purpose of the chosen period is to provide a more current study that will serve as a reference for subsequent studies. The study follows a structured organization to present a comprehensive analysis. It begins with an introduction, providing background and objectives. A literature review contextualizes the study within existing research. The methodology outlines the theoretical framework, data collection, and analysis techniques. The subsequent section presents data analysis and results, followed by a detailed discussion of the findings. The study concludes by summarizing key outcomes and offering recommendations.

2. Literature Review

2.1. Theories of stock market

According to economic theory, stock markets help investors allocate capital, offer a multiplicity of financial instruments at cheap costs, and reduce investor risk. The evolution of the stock market reflects the growth of the financial industry as a whole. This goes to show that the stock market's expansion is dependent on the growth of the financial system (Li *et al*., 2021; Hiya & Syafi'i, 2021). Within the endogenous growth model, Toan & Thu-Trang (2021), and Caporale (2005) analyses the theoretical mechanisms via which stock markets influence the long-run performance of the economy. The wealth effects hypothesis of households' return on portfolio savings in the stock market, according to Dimitris *et al*. (2024), and Ludvigson & Steindel (1998), influences long-term economic growth, whereas Chikwira & Mohammed (2023) claims that liquid stock markets have a greater positive influence on output growth than risky and costly stock markets. Financial market integration strength, according to Smith & Devereux (1994), is necessary to reduce stock market volatility and boost

return levels. Nonetheless, closer integration of financial markets will necessitate the establishment of high-quality institutions to manage market human impulses (Rangkuti, 2019; Acemoglu, 2007).

On the divergent views on stock price behaviour, there are five schools of expertise. *Fundamentalist schools, random walk hypothesis schools, technical schools, behavioural finance schools, and macro-economic hypothesis scho*ols are among them. Fundamentalists posit that the stock value of a company is given by futuristic earnings estimates and the discount rate applied to the profits (Bakar & Rosbi, 2019; Fakhroni et al., 2018). To analyze company shares, fundamentalists utilize present value concepts to calculate the price of the stock using dividends and earnings. The technical school disagrees with the fundamentalists and argues that stock prices tend to follow a predictable pattern where each price is influenced by previous prices and subsequent prices are interdependent. Technical analysts, according to Smith (1990), are interested in examining variations in market prices, trading volume, and investor sentiment.

Researchers namely Oluwafemi & Balogun (2024), Mettle *et al.* (2024), Sourav (2024), in favour of the *random walk* postulate that stock price movements are a probability distribution with various possible outcomes. The random-walk postulate is based on the efficient market hypothesis, which states that investors modify securities quickly to reflect the impact of the news. According to proponents of the efficient capital market theory, randomness in the movement of stock prices would not allow profit to be made from stock market speculation. The persistence of random shocks is an intriguing aspect of random walks. Scholars such as Fama (1995), Fama and Kenneth (1989, 1992), and Malkiel (2020) have conducted empirical tests of the random walk hypothesis in connection to stock returns. The statistical unpredictability of subsequent variations in stock prices was separately tested by these authors. Their findings were inconclusive and unsatisfactory, showing minor deviations from randomization. Fewer than three conditions, according to the behavioural school of finance, markets may fail to represent economic realities. When all three of these conditions are met, the theory predicts that price distortions in financial markets will be severe and long-lasting. Irrational behaviour is the initial behavioural state. It asserts that investors act irrationally when they fail to properly digest all available data while establishing their expectations for a company's future performance.

Recent researches on the *efficient market theory* such as Rajan *et al*. (2024), Nyakurukwa & Seetharam (2023), Sun & Zeng (2022), Tran and Leirvik (2019), Mondher and Martinez (2019) propose that all information is incorporated into prices by rational investors. According to EMH, it is difficult for investors to consistently exploit mispricing or timing opportunities since relevant information is rapidly reflected in asset prices. Moreover, the costs associated with frequent trading, including transaction fees and taxes, can erode potential gains. In effect, prices reflect all publicly accessible market statistics, and also adjust rapidly to new information. The behavioural finance theory developed by various founders, including Tversky and Kahneman (1970) and Thaler (1990), states that it is a multidisciplinary field that integrates psychological principles into the study of financial markets. It acknowledges that investors are not always driven by logic and reason, highlighting the impact of emotions, cognitive errors, and biases on financial choices. Herding behaviour, where investors follow the crowd without independent evaluation, and anchoring, where decisions are influenced by fixed reference points, contribute to market anomalies. Behavioural biases, including confirmation bias, can skew decision-making. The *capital asset pricing theo*ry (CAPT) upholds that portfolio investments are ascertained vis-à-vis total risk, calculated as the variance or standard deviation of the return of the portfolio. The market timing theory developed by Malcolm & Jeffrey (2002) revolves around the strategy employed by investors to predict and capitalize on future movements in financial markets or individual stocks. The theory upholds the significance of buying or selling assets at the most advantageous times to maximize returns and minimize risks. Investors employing market timing strategies typically analyze various indicators, including economic data, market trends, and price patterns, in an attempt to forecast the direction of asset prices. The idea is to make investment decisions based on predictions about when markets or specific stocks are poised to rise or fall. Proponents argue that successful market timing can lead to higher profits and reduced losses.

Liquidity preference theory (LPT), formulated by Keynes (1936), but recently appraised by Murebu *et al*. (2024), Yoon & Neupane (2024), Bakala (2024), Wray (2023), Almeida (2021), Jossa (2021), Culham (2020), Kontuš & Mihanović (2019) is a fundamental concept in macroeconomics that delves into the factors influencing the demand for money. According to this theory, investors exhibit a preference for liquidity, that is, asset conversion into cash, and demand a premium for holding securities with longer maturities. The core principle of LPT revolves around the uncertainty associated with future interest rates. Keynes argued that individuals and investors are naturally risk-averse and seek to minimize the potential loss resulting from changes in interest rates. In a dynamic economic environment where interest rates are subject to fluctuations, uncertainty about the future value of money becomes a crucial factor in decision-making. The theory posits that investors view money as a highly liquid asset, as it can be readily used for transactions and is devoid of the risks associated with changes in value. Nonetheless, when investors decide to forego the immediate liquidity of money and invest in longer-term securities, they demand a premium, commonly referred to as the liquidity premium. This premium compensates investors for the perceived risk of tying up their funds in less liquid assets, given the uncertainty surrounding future interest rates. The LPT therefore introduces the idea that the interest rate on a long-term security is composed of two components: the future short-term interest rates and the liquidity premium. The latter reflects the compensation investors require for parting with the flexibility and immediacy of cash.

2.2. Related works on determinants impacting stock returns

Although African stocks are underperforming, according to Yaya et al. (2024), stocks are less risky at the median quantile value, making the Kenyan stock market the most precarious. Under calm market conditions, however, the stock markets in Nigeria, Egypt, and South Africa are influenced by other stock markets. Sethy and Tripathy (2024) discovered that illiquidity shocks had an uneven impact on conditional volatility in the Indian stock market. According to Doojin et al. (2024), asymmetric effects of funding liquidity are more noticeable for companies that are traded less broadly in emerging markets. The System Generalized Method of Moment (GMM) results from Muzaffar & Malik (2024) suggest that, in the Asian setting, there is an interaction between greater market liquidity and lower levels of volatility. In fact, this illustrated how liquidity and volatility are inversely related. Strong cross-asset lower-tail dependency in return and large cross-asset upper-tail interdependence in lack of liquidity measures were discovered by Zhang et al. (2024). The fact that returns are typically higher in bitcoin markets with lower liquidity was another discovery from the research.

Komba et al. (2024) found that exchange rates had a short-term inverse association with stock return fluctuations: they had a considerable impact. The price-to-earnings ratio, turnovers, and circulating market value are some of the major negative factors that affect stock market returns, according to Peng's (2023) analysis. Aawaar et al. (2023) fitted a data with the SGARCH, EGARCH, and GJR-GARCH models and realized that exchange rates and previous domestic market return volatility are two of the primary drivers of stock return volatility during the COVID-19 pandemic in Africa. They also observed that African stock markets became sensitive to advanced market volatility during the GFC and have remained sensitive during the post-global financial crisis period. The empirical study by Ali et al. (2023) shows that the Pakistani equities market had a notable fall during the financial crisis, with the less liquid stocks being predominantly impacted. This decline was caused by a flight to liquidity phenomena. According to the findings, the Pakistani stock market prices flight-to-liquidity risk, making large stocks comparatively more appealing during uncertain periods.

According to Gholami et al. (2023) and Tauseef and Dupuy (2022), because liquidity and yield are directly correlated, investors globally choose companies with greater returns and lower liquidity risk. According to Díaz and Escribano (2022), the various aspects of liquidity are of significance when determining stock market results. Market liquidity shocks are priced more slowly in a group of stocks with high returns and more quickly in a group of stocks with poor returns, according to Yasuhiro & Takehide (2022). The results of Papadamou et al. (2022) indicate a favorable nexus between liquidity and cannabis stock performance. Market investors demand a liquidity premium for equities whose illiquidity fluctuates in tandem with market illiquidity and returns, according to empirical research by Musneh et al. (2021), where there was a positive premium. Conversely, there is a positive premium for stocks whose market return is higher during an illiquid market.

Hacini et al. (2021) discovered that liquidity risk significantly impairs the financial performance as assessed by Saudi Arabian banks, based on the Pool, Fixed-effects, and Random-effects analyses. Wang et al. (2021) found a substantial connection between the London Stock Exchange's liquidity and return distributions. Using resilience as a proxy for liquidity, Jian et al. (2020) discovered a strong link between liquidity and projected returns. Marozva (2019) asserts that liquidity has a major favorable impact on pricing returns on the JSE since there is a positive association between illiquidity and stock excess returns. According to Violita's (2019) research, stock returns were positively and significantly impacted by stock liquidity. Exchange rates have a substantial impact on stock indexes, according to Zarei et al. (2019). Based on the Autoregressive Distributed-lag (ARDL), Bhattacharya et al. (2019) found a long-term association between multidimensional liquidity metrics such as trade volume, spread, market efficiency coefficient, turnover rate, trading probability, and stock market index. In particular, the turnover rate has a short-term negative effect on the stock market but a long-term beneficial one. Interest rates and currency rates are two of the most significant al macroeconomic factors that have a negative impact on stock returns, according to Ayesha *et al.* (2022). This is on top of the negative impact that news emotion about economic uncertainty has on market performance.

2.3. The Gaps in the reviewed studies

There are a few gaps in the reviewed literature above. In the domain of financial markets, the relationship between stock market volatility, liquidity risk, and stock returns, moderated by exchange rate volatility, remains a critical area of research, especially in emerging economies. Notable studies have examined these dynamics within specific contexts or regions, yet substantial gaps persist when extending these analyses to a broader set of emerging markets such as Brazil, Russia, India, China, South Africa, Nigeria, Ghana, and Malaysia. Several studies have pointed to a critical understanding of how liquidity conditions interact with market returns but often do not incorporate the moderating effect of exchange rate volatility. A clear gap in the literature is evident in the comprehensive and comparative analysis of these dynamics across a diverse array of emerging markets, each with unique economic and regulatory frameworks. Furthermore, the use of exchange rate volatility as a control variable remains underexplored, particularly in recent times whereby the erratic behavior of exchange rate as an international price is eminent. Also, the above research fails to analyze how exchange rates mediate in the relationship between market volatility, liquidity risk, and stock returns across different national contexts. This study addresses the gap.

3. Methodology

The methodology for the study entails estimating financial models using both Fractionally Integrated Generalized Autoregressive Conditional Heteroskedasticity - Dynamic Conditional Correlation (FIGARCH-DCC) regression methods involve navigating the complexities of conditional quintiles and dynamic correlations. FIGARCH-DCC, combining Fractionally Integrated GARCH for volatility and Dynamic Conditional Correlation for inter-asset correlations allows for long memory in volatility, capturing persistent trends over time. The models can be integrated through joint or sequential estimation, with considerations for computational intensity and model diagnostics. In the joint estimation approach, parameters of both ARDL regression and FIGARCH-DCC were estimated simultaneously, demanding specialized software and computational resources.

The FIGARCH is an extension of the GARCH model, allowing for a more flexible representation of long-memory processes in volatility modeling. Unlike traditional GARCH models, FIGARCH incorporates fractional integration, which is essential for capturing long-range dependence in financial returns. This enables the model to better capture persistence and smoothness in volatility changes. The Dynamic Conditional Correlation (DCC) models the dynamic nature of correlations between multiple financial assets. Accordingly, volatility and Correlation Dynamics of the FIGARCH-DCC method is exclusively valuable in understanding the joint behavior of asset returns and their changing interdependencies. In line with Bordignon, Caporin & Lisi (2004), we specify the FIGARCH model with seasonality, which allows for both periodic patterns and long memory behaviour in the conditional variance:

$$\sigma_t^2 = \alpha_0 + \alpha(L)\epsilon_t^2 + \beta(L)\sigma_t^2 + [1 - (1 - L^S)^d]\epsilon_t^2 \tag{1}$$

The first three terms in the conditional variance reproduce the general GARCH model; the fourth term introduces a long memory component which operates at zero and seasonal frequencies. The parameter S represents the length of the cycle, while d indicates the degree of long memory. Repositioning the terms in (1), the specification of the FIGARCH(p, d, q) model attained as:

$$[1 - \vartheta(L)]\sigma_t^2 = \alpha_0 + \sigma_t^2 + [1 - \vartheta(L) - \phi(L)(1 - L)^d]\epsilon_t^2 \tag{2}$$

From Eq. (2), the conditional variance h of g is given by:

$$\sigma_t^2 = \alpha_0[1 - \vartheta(1)]^{-1} + \{1 - [1 - \vartheta(1)]^{-1}\phi(L)(1 - L)^d\}\epsilon_t^2 \tag{3}$$

$$= \alpha_0[1 - \vartheta(1)]^{-1} + \lambda_1 L + \lambda_2 L^2\epsilon_t^2 \tag{4}$$

For the FIGARCH$(p, d. q)$, the conditional variance in the ARCH(∞) representation in Eq. (4) is non-negative, i.e., $\lambda_k \geq 0$ for $k = 1, 2, \ldots$. The specification of the FIGARCH-DCC model within the context of study variables is as follows:

$$\sigma tmv = \omega + \sum i=1 p \alpha i \epsilon t - imv + \sum j=1 q \beta j \sigma t - jmv + \sum k=1 d \gamma k (dk-1) d-1 \delta \log(\sigma t - kmv) \tag{5}$$

$$\sigma tsr = \omega + \sum i=1 p \alpha i \epsilon t - isr + \sum j=1 q \beta j \sigma t - jsr + \sum k=1 d \gamma k (dk-1) d-1 \delta \log(\sigma t - ksr) \tag{6}$$

$$\sigma tlr = \omega + \sum i=1 p \alpha i \epsilon t - ilr + \sum j=1 q \beta j \sigma t - jlr + \sum k=1 d \gamma k (dk-1) d-1 \delta \log(\sigma t - klr) \tag{7}$$

$$\sigma terv = \omega + \sum i=1 p \alpha i \epsilon t - ier\text{v} + \sum j=1 q \beta j \sigma t - jerv + \sum k=1 d \gamma k (dk-1) d-1 \delta \log(\sigma t - kerv) \tag{8}$$

$$\sigma tmsv = \omega + \sum i=1 p \alpha i \epsilon t - imsv + \sum j=1 q \beta j \sigma t - jmsv + \sum k=1 d \gamma k (dk-1) d-1 \delta \log(\sigma t - kmsv) \tag{9}$$

The DCC model captures the dynamic correlations between the different volatility series. This is mathematically portrayed in Eq. (10).

$$Rt = Dt \odot (Qt \odot Dt) \tag{10}$$

where Dt is a diagonal matrix of the conditional standard deviations, Qt is the conditional correlation matrix, and $\odot$ denotes element-wise multiplication. To estimate the determiannst of stock market return, we estimated the following error correction model (ecm) according to Pesaran and Pesaran (1997):

$$\ln sr_t = \omega_0 + \sum_{i=1}^{m} \omega_1 \Delta \ln sr_{t-i} + \sum_{i=1}^{n} \omega_1 \Delta \ln msv_{t-i} + \sum_{i=1}^{n} \omega_2 \Delta \ln mv_{t-i} + \sum_{i=1}^{n} \omega_3 \Delta \ln lr_{t-i} + \sum_{i=1}^{n} \omega_4 \Delta \ln derv_{t-i} + \vartheta ecm_{t-1} \tag{11}$$

The parameters of the FIGARCH-DCC model were estimated using MLE, a statistical method that seeks to maximize the likelihood of observing the given data. Also, due to the complexity of the FIGARCH-DCC model, numerical optimization algorithms such as the Newton-Raphson method or the Broyden-Fletcher-Goldfarb-Shanno (BFGS) algorithm were utilized to find the optimal parameter values. The FIGARCH-DCC method provides a powerful framework for modeling both volatility and correlation dynamics in financial time series data. Its ability to capture long-memory effects and time-varying correlations makes it a valuable tool for researchers, analysts, and practitioners in the field of financial econometrics. The

study utilizes quarterly data spanning from the year 2000Q1 to 2023Q4 for the mentioned variables such as money supply variation market volatility, liquidity risks, exchange rate volatility, and stock returns. The chosen variables encompass critical aspects of the economic landscape, including monetary indicators, market dynamics, liquidity considerations, foreign exchange behavior, and stock market performance. The quarterly series enables a granular examination of the trends and relationships over the entire period. The variable of money supply variation represents changes in the money supply, reflecting the dynamics of money creation and circulation in the economy. Market volatility was measured as the degree of variation and fluctuation in the financial markets, indicating the level of uncertainty and risk. Liquidity risk was measured as the exchange rate volatility was calculated as the variability and fluctuations in exchange rates. Stock returns were calculated as the as eth difference between closing stock price of today and that of yesterday.

3.1. Data issues

The data used in the study are sourced from database of the World Bank. The selected countries include Brazil, Russia, India, China, South Africa, Nigeria, Ghana, and Malaysia. This diverse range of countries enriches the study by considering different economic contexts and policy environments. The World Bank provides comprehensive economic and financial data, making it a valuable source for macroeconomic indicators and cross-country comparisons and data from multiple dynamic banks contribute to the richness of the study, providing detailed insights into the monetary, financial, and economic conditions of the selected countries. The combination of these data sources and the inclusion of multiple variables and countries enhance the robustness and applicability of the study, facilitating a comprehensive analysis of the relationships between money supply variation, market volatility, liquidity risks, exchange rate volatility, and stock returns over the specified period. The list of ASEAN stock market researched in this study includes the Singapore Exchange (SGX), Bursa Malaysia Stock Exchange (YSX), the Stock Exchange of Thailand (SET), Indonesia Stock Exchange (ISE), the Vietnam Stock Exchange (VNX), the Cambodia Securities Exchange (CSX), the Lao Securities Exchange (LSX), and the Philippine Stock Exchange. The Stock Exchange of Thailand (SET) is recognized as one of the World advanced emerging markets in the World with its comparative advantages in liquidity and diversity of investors. Financial and business strengths are key highlights of Thailand's listed companies.

4. Results

The descriptive Statistics for each country, unit root test, and co-integration test results are reported in the appendix section of the paper. The Johansen methodology accomplishes co-integrating nexus among money supply variation, market volatility, liquidity risks, exchange rate volatility, and stock returns. The results of the FIGARCH-DCC (1,1,1) estimates for stock market in each country is shown in Tables 1, 2, 3, 4, 5, 6, 7, and 8. Overall, the estimates indicate presence of significant permanent effect of stock volatility and liquidity risk at the variable at 5 percent level of significance. By implication, there is high persistence of shocks that influences return that do not die off quickly.

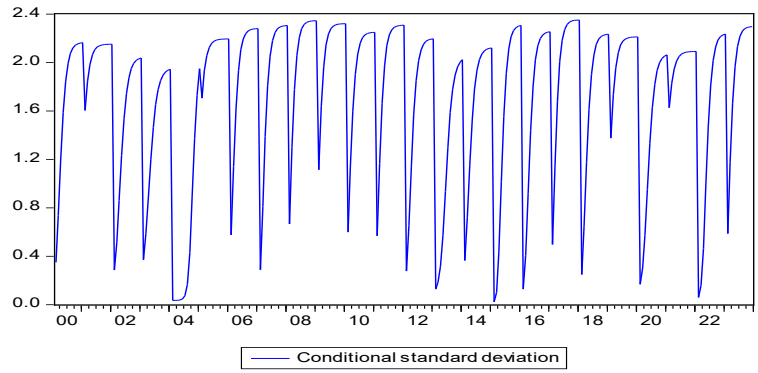

Fig. 1. FIGARCH-DCC plot for Singapore Exchange (SGX)

Source: Authors' estimation results with Eviews 13

In a FIGARCH graph for Singapore Exchange, the x-axis represents time, while the y-axis depicts volatility in exchange rate. Peaks and valleys on the graph indicate periods of high and low volatility which happened throughout the period reflecting the volatility clustering present in stock market. The persistence of volatility shocks over time is evident through long memory, as past volatility influences future volatility. Fluctuations in volatility capture the conditional heteroskedasticity, showing volatility changes in response to past information. The graph demonstrates the FIGARCH model and the estimated results of Table 1 effectively capture these dynamics, providing insights into the behavior of volatility in Singaporean financial markets. The diagram shows periods where the volatility is high, as indicated by peaks, and periods of relative calm, where the line is at its lower points. This reflects the common financial phenomenon known as volatility bunching, where huge variations tend to be followed by huge variations, and small variations follow small variations. The pattern of persistent peaks and troughs suggests that shocks to the exchange rate have a lasting impact on Singapore Exchange. In FIGARCH models, this is typically indicative of long memory in volatility, meaning that the effects

of past shocks on volatility decay very slowly over time. This can result from structural economic characteristics or persistent market behaviors.

Table 1
FIGARCH-DCC results for Singapore Exchange (SGX)

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
c	0.117750	0.002028	58.07075	0.0000
sr1(-1)	0.924767	0.000128	7249.806	0.0000
Variance Equation				
c	-0.197344	0.022062	-8.945130	0.0000
resid(-1)^2	-0.274594	0.038766	-7.083293	0.0000
resid(-1)^2*(resid(-1)<0)	-1.027297	0.038236	-26.86733	0.0000
Garch(-1)	0.695147	0.019152	36.29714	0.0000
d-coefficient	0.260953	0.001337	195.1780	0.0000

Source: Authors' results using Eviews 13

Table 2
FIGARCH-DCC results for Bursa Malaysia Stock Exchange (YSX)

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
c	0.608341	1.072370	0.567287	0.5705
sr(-1)	0.010574	0.786669	0.013441	0.9893
Variance Equation				
c	73.31640	48.72664	1.504647	0.1324
resid(-1)^2	0.047299	0.042243	1.119676	0.2629
resid(-1)^2*(resid(-1)<0)	-0.099552	0.050300	-1.979174	0.0478
Garch(-1)	0.568524	0.287465	1.977716	0.0480
d-coefficient	0.196728	0.003365	58.46300	0.0000

Source: Authors' results using Eviews 13

The FIGARCH-DCC results for Bursa Malaysia are shown in Table 2. The persistence of volatility shocks over time is evident through long memory, as past volatility influences future volatility. Fluctuations in volatility capture the conditional heteroskedasticity, showing volatility changes in response to past information. The results demonstrate the FIGARCH model effectively captures these dynamics, providing insights into the behavior of volatility in Malaysian financial markets.

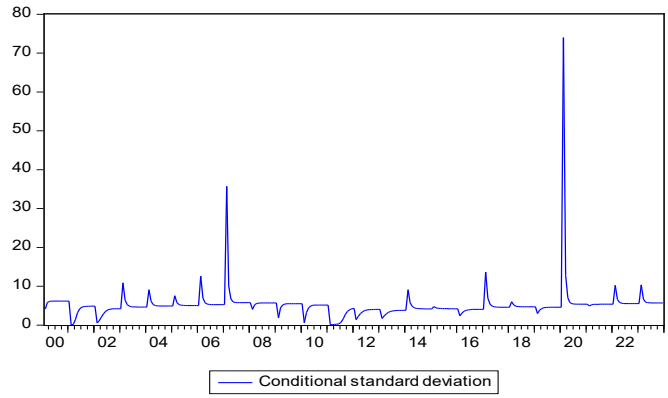

Fig. 2. FIGARCH-DCC plot for Bursa Malaysia Stock Exchange

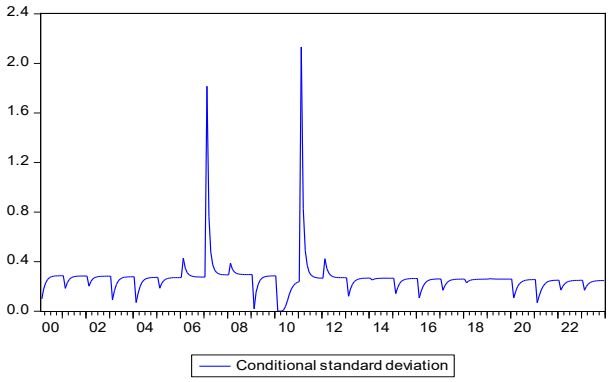

Fig. 3. FIGARCH-DCC plot for the Stock Exchange of Thailand (SET)

Source: Authors' estimation results with Eviews 13

Fig. 2 for Bursa Malaysia showcases clustering of volatility inherent in the foreign exchange rate only in 2006 and 2020. This could be explained by outbreak of pandemic that characterized the period. The enduring impact of volatility shocks over time is apparent through long memory, as prior volatility influences subsequent volatility. Volatility fluctuations reflect conditional heteroskedasticity, revealing volatility adjusts in reaction to historical information. The graph showcases that the FIGARCH model adeptly captures predictable exchange rate dynamics, offering valuable insights into the stability patterns in the Bursa Malaysia. The plot does reveal a constant level of volatility; instead, it fluctuates over time, suggesting low market's uncertainty regarding exchange rate. For Malaysia, which has an economy significantly influenced by global commodity prices, and oil prices understanding the nature of this volatility is critical. It can impact decisions related to foreign currency borrowing, reserves management, and even the setting of monetary policy. From a policy-making standpoint, such a pattern of volatility requires the central bank and financial regulators to be proactive in employing tools to manage liquidity risk. They may adjust monetary policy to mitigate the negative impacts of excessive exchange rate volatility risk on the economy.

Fig. 3 depicts the conditional standard deviation of Stock Exchange of Thailand over a set period. The graph shows volatility clustering. The sharp spikes indicate moments of extreme volatility, suggesting that certain events or information releases have caused significant uncertainty or rapid adjustments in the exchange rate. The lower, more stable periods suggest less turbulent times when the exchange rate is relatively predictable. These spikes potentially are correlated with significant developments in the forex market that have broader implications for financial stability and currency valuation. For India, a country with strict capital controls and a managed float exchange rate, the FIGARCH model's ability to capture long-memory volatility is crucial. It helps in identifying the persistence of shocks over time, indicating the potential for past events to have a long-lasting impact on the real effective exchange rate volatility. The FIGARCH-DCC results for Stock Exchange of Thailand are reported in Table 3 below.

Table 3
FIGARCH-DCC results for Stock Exchange of Thailand (SET)

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
c	-0.040034	0.004376	-9.147705	0.0000
sr1(-1)	0.000524	5.62E-05	9.334492	0.0000
Variance Equation				
c	3.313730	0.246660	13.43439	0.0000
resid(-1)^2	-2.130717	0.079587	-26.77230	0.0000
resid(-1)^2*(resid(-1)<0)	0.210481	0.058424	3.602630	0.0003
Garch(-1)	0.190379	0.060331	3.155591	0.0016
d-coefficient	0.174215	0.002546	68.42694	0.0000

Source: Authors results suing Eviews 13

The result of the FIGARCH-DCC (1,1,1) for Stock Exchange of Thailand also signifies permanent effect and high persistent of shock in the volatility of stock market returns at 5 percent level of significance owing to market volatility and liquidity risk. This means that shocks to return have a lasting impact and are highly persistent over time.

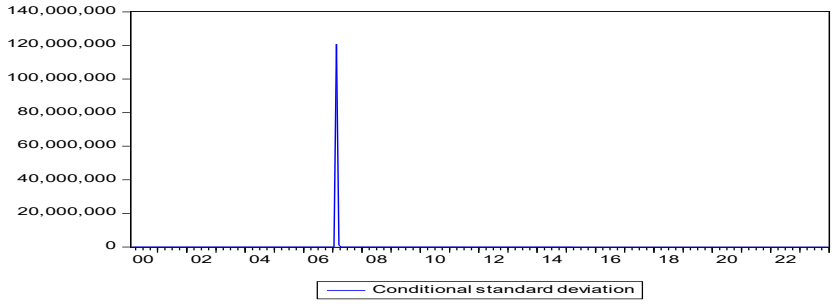

Fig 4. FIGARCH-DCC plot for Indonesia Stock Exchange (ISE)
Source: Authors' estimation results with Eviews 13

Fig. 4 describes the conditional standard deviation from a FIGARCH model for the Indonesia stock exchange. The conditional standard deviation, which is a measure of market volatility, seems to be quite high only in 2007. Such a spike is an indicative of a volatility shock or an unusual transaction that caused a sudden volatility in market returns. The tall spike indicates period of extraordinary uncertainty or market volatility risk, which could be attributed to various economic or political events impacting market perceptions. Given the association with macroeconomic variables, the spike could also point to a period of intense trading activity, either due to speculative trading, regulatory news related to financial market in Indonesia, or macroeconomic events that drove investors to or away from alternative assets. Notwithstanding 2007 spike, stock market volatility in Indonesia was relatively stable. The FIGARCH-DCC results for Indonesia are reported in Table 4.

Table 4
FIGARCH-DCC results for Indonesia Stock Exchange (ISE)

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
c	0.192309	8.03E-05	2394.237	0.0000
sr(-1)	0.001370	6.32E-07	2167.915	0.0000
Variance Equation				
c	4.794966	0.000550	8710.813	0.0000
resid(-1)^2	-2.690546	0.001702	-1580.546	0.0000
resid(-1)^2*(resid(-1)<0)	0.076693	2.66E-05	2880.423	0.0000
Garch(-1)	0.202649	0.000119	1698.644	0.0000
d-coefficient	0.128567	0.0085652	15.01039	0.0000

Source: Authors results suing Eviews 13

The graph of the Vietnam Stock Exchange is displayed in Fig. 5 below. It represents the conditional standard deviation of the Vietnam Stock Exchange over a given time period, as suggested by the FIGARCH model analysis. In the graph, we

observe periods where the conditional standard deviation spikes, indicating heightened volatility during these times. These could correspond to external economic shocks, policy changes, or significant market movements that affected the stability of the the Vietnam Stock Exchange. The relatively calm periods, where the conditional standard deviation is lower, suggest less uncertainty and more stability in the returns. In the context of the Vietnam Stock Exchange, such fluctuations in the conditional stock returns is reflective of the country's economic response to both domestic factors (like changes in inflation or economic growth rates) and international events like fluctuations in crypto prices or global market dynamics.

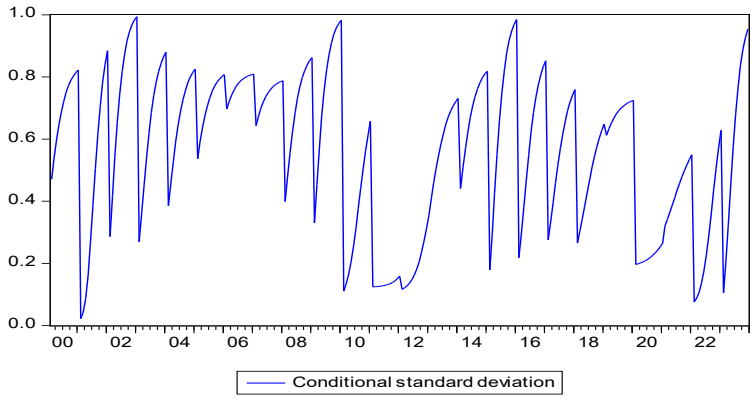

Fig. FIGARCH-DCC plot for the Vietnam Stock Exchange (VNX)

Source: Authors' estimation results with Eviews 13

The results of the FIGARCH-DCC (1, 1, 1) for the Vietnam Stock Exchange reported high persistence of volatility of the variable at 5 percent level of significant. The FIGARCH DCC results for Vietnam are shown in Table 5. The results show that volatility shocks have lasting impact on returns and are highly persistent over time. The conditional standard deviation graph as shown below:

Table 5

FIGARCH-DCC results for the Vietnam Stock Exchange (VNX)

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
c	-0.020192	0.006716	-3.006289	0.0026
sr(-1)	0.000328	0.000108	3.028134	0.0025
Variance Equation				
c	3.899467	0.257335	15.15328	0.0000
resid(-1)^2	-2.207986	0.126423	-17.46506	0.0000
resid(-1)^2*(resid(-1)<0)	-0.570660	0.067042	-8.511983	0.0000
Garch(-1)	0.047930	0.014046	3.123590	0.0028
d-coefficient	0.3318724	0.001567	211.7884	0.0000

Source: Authors' results suing Eviews 13

Table 6

FIGARCH-DCC results for the Cambodia Securities Exchange (CSX)

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
c	0.025045	0.005185	4.830336	0.0000
sr(-1)	0.000131	2.68E-05	4.892093	0.0000
Variance Equation				
c	4.301901	0.248018	17.34508	0.0000
resid(-1)^2	-2.441948	0.082626	-29.55408	0.0000
resid(-1)^2*(resid(-1)<0)	-0.009204	0.034708	-0.265184	0.7909
Garch(-1)	0.278275	0.001987	83.13387	0.0000
d-coefficient	0.290143	0.0356812	8.131537	0.0000

Source: Authors results suing Eviews 13

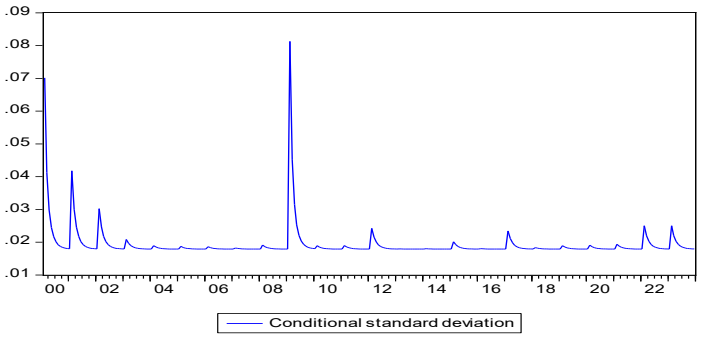

Fig. 6. FIGARCH-DCC plot for the Cambodia Securities Exchange (CSX)

Source: Authors' estimation results with Eviews 13

While the results of Table 6 show that stock market volatility shocks have persistent effects on returns in the Cambodia Securities Exchange, Figure 6 represents FIGARCH-DCC results for the Cambodia Securities Exchange. From the graph, we observe periods of relative calm interspersed with spikes in volatility in Cambodia. The pronounced spikes indicate moments of increased uncertainty or shock to the system, which could be caused by various factors such as policy changes. The higher peaks suggest more turbulent periods where the nominal exchange rate experienced greater than normal fluctuations, which could have implications for economic decisions and risk management. The volatility spikes are not symmetrical and appear to dissipate over time, indicating a reversion to more stable state aftershocks. This is characteristic of financial time series where volatility clusters; large changes tend to be followed by large changes of either sign and small changes tend to follow small changes. Consequently, in the Cambodia Securities Exchange, these volatility patterns associated with returns imply that while the market may generally be stable, it is occasionally subject to significant shocks. The results of the FIGARCH-DCC (1, 1, 1) for the Lao Securities Exchange (LSX) are reported in Table 7. The FIGARCH DCC results for the Lao Securities Exchange indicate periods of high and low volatility which shows market consolidation within the range from 2000-2023, revealing the clustering of volatility patterns seen in their stock market. The enduring influence of volatility shocks over time becomes evident through the concept of long memory, where past volatility significantly shapes future volatility. The fluctuations in volatility highlight conditional heteroskedasticity, illustrating how volatility responds to historical data.

Table 7
FIGARCH-DCC results for the Lao Securities Exchange (LSX)

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
C	-0.000434	5.93E-05	-7.316075	0.0000
sr(-1)	1.000451	5.17E-05	19346.34	0.0000
Variance Equation				
c	-3.597058	0.214576	-16.76357	0.0000
resid(-1)^2	-2.149749	0.095333	-22.54994	0.0000
resid(-1)^2*(resid(-1)<0)	-0.713347	0.063278	-11.27316	0.0000
Garch(-1)	0.268554	0.043629	6.155409	0.0000
d-coefficient	0.046723	0.010054	4.647205	0.0000

Source: Authors' results suing Eviews 13

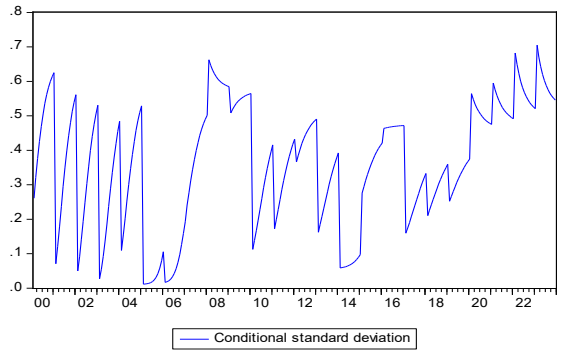

Fig. 7. FIGARCH-DCC plot for the Lao Securities Exchange (LSX)
Source: Authors' estimation results with Eviews 13

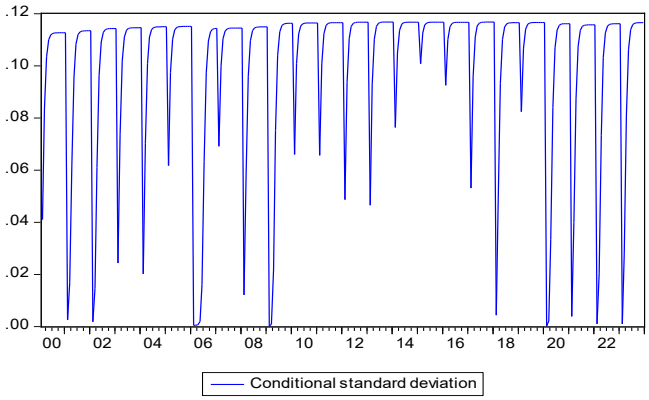

Fig. 8. FIGARCH-DCC plot for the Philippine Stock Exchange

In Fig. 7, we observe periods of heightened volatility (peaks) followed by intervals of relative calm (troughs), indicative of the clustering of volatility, a common phenomenon in financial time series known as volatility clustering with the crowding effect extending over multiple periods. These findings for the Lao Securities Exchange (LSX) are particularly relevant. As a country that might be experiencing dynamic shifts in liquidity, such changes could be linked to the observed volatility in the exchange rate due to the interconnectedness of crypto currencies with financial markets (Umoru et al. 2024). The presence of long memory in volatility, suggested by the FIGARCH model, implies that shocks to the stock return persist longer than what would be expected under a short memory process, affecting the predictability and stability of the stock market behavior in Lao. Table 8 reports the FIGARCH-DCC (1, 1, 1) estimates for the Philippine Stock Exchange (PSE). It is clear from the results that there is permanent effect and high persistent of shock in the market volatility and liquidity risk. The fluctuations in volatility underscore conditional heteroskedasticity; demonstrating volatility reacts to historical data. The FIGARCH diagram of Figure 8 illustrates the conditional standard deviation, a measure of volatility for Malaysia stock exchange. Fig. 8 indicates periods of high volatility (peaks) followed by lower volatility (troughs), which repeat over the observed time frame. This pattern suggests that there are episodic bursts of volatility which then subside, only to pick up again. This cyclical pattern of volatility can be indicative of a market that is influenced by recurring events or behaviors. The pronounced spikes in volatility could also point towards market reactions to sudden economic events, such as monetary policy shifts, political developments, or even global economic shocks. The spikes will correspond to significant changes in

market conditions (such as price surges or crashes or liquidity shortage), which then impact the perceived stability of the national currency in foreign exchange markets. The FIGARCH-DCC estimates of Table 8 also reveal significant volatility persistence of the Philippine Stock Exchange.

Table 8
FIGARCH-DCC results for the Philippine Stock Exchange (PSE)

Mean Equation				
Variable	Coefficient	Std. Error	z-Statistic	Prob.
c	0.000610	0.000466	1.309867	0.1902
sr(-1)	8.31E-06	5.15E06	1.613439	0.1066
Variance Equation				
c	4.245687	0.277312	15.31014	0.0000
resid(-1)^2	-2.379800	0.137631	-17.29117	0.0000
resid(-1)^2*(resid(-1)<0)	-0.248751	0.034625	-7.184144	0.0646
Garch(-1)	0.093508	3.204743	1.580108	0.1141
d-coefficient	0.165187	0.001987	83.13387	0.0000

Source: Authors' results suing Eviews 13

4.1. ARDL Results

For sake robustness checks, we estimated panel short-run ARDL regressions for each stock market in each of the countries. These are reported in Tables 9, 10, 11, 12, 13, 14, 15, and 16 respectively. The coefficient of money supply variation for the Singapore Exchange (SGX) is 2.174637. It suggests that, on average, a one-percent increase in money supply variation is associated with a 2.17 percent increase in stock returns, holding other variables constant. In other words, an increase in money supply variation tends to lead to higher stock returns, all else being equal. This might imply that when there's more money circulating in the economy (due to factors such as central bank policies), it positively impacts stock returns. The coefficient of 0.66984 indicates that, on average, a one-percent increase in market volatility is associated with a 0.67 percent increase in stock returns, holding other variables constant. This is somewhat counterintuitive as one would typically expect market volatility to have a negative impact on stock returns (see Umoru *et al.,* 2024). However, it's essential to remember that correlation does not imply causation. This coefficient could suggest that during periods of high market volatility, there might be opportunities for higher returns for certain investors or that market volatility is somehow positively correlated with market movements. With a coefficient of 0.300509, it suggests that, on average, a percent-unit increase in liquidity risks is associated with a 0.30 percent increase in stock returns, holding other variables constant. This implies that higher liquidity risks might be associated with slightly higher stock returns. This could be due to investors demanding higher returns to compensate for the increased risk associated with less liquid assets. The coefficient of 1.50416 indicates that, on average, a one- percent increase in exchange rate volatility is associated with a 1.50- percent increase in stock returns, holding other variables constant. Similar to market volatility, this relationship might seem counterintuitive. However, it could imply that during periods of high exchange rate volatility, there are opportunities for profit-making through currency fluctuations, which could positively impact stock returns. Also, Prob. (p-value) all variables show highly significant coefficients ($p < 0.0001$), implying a strong association with stock returns and the R-square model explains around 52.26% of the variation in stock returns, indicating a reasonably good fit. So, these findings underscore the considerable influence of money supply variation, market volatility, liquidity risks, and exchange rate volatility on stock returns in the Singapore Exchange (SGX), offering valuable insights for investors and policymakers. Higher money supply variation and exchange rate volatility are associated with increased stock returns, which could imply opportunities for profit-making through currency fluctuations or increased liquidity in the market.

For Bursa Malaysia Stock Exchange (YSX), a one- percent increase in MSV is associated with a 0.645202 percent increase in stock returns. The coefficient is significant at the 0.05 level. This implies that changes in the money supply have a significant impact on stock returns. Higher money supply can lead to increased spending and investment, which can positively influence stock returns. Market volatility (MV) has a larger coefficient (72.40712) compared to other variables, indicating that it has a substantial impact on stock returns. The coefficient is highly significant, suggesting that changes in market volatility strongly influence stock returns. High volatility can lead to uncertainty and risk aversion among investors, affecting stock prices significantly. The coefficient for liquidity risks (LR) is small (0.012447) and statistically insignificant (Prob = 0.8066), indicating that liquidity risks do not have a significant impact on stock returns in this model. This implies that factors related to liquidity risks may not be driving stock returns in the studied context. Exchange rate volatility (ERV) has a coefficient of 0.308598, indicating that it has a moderate impact on stock returns. The coefficient is significant, suggesting that changes in exchange rate volatility influence stock returns. Fluctuations in exchange rates can affect the competitiveness of firms and international trade, thereby impacting stock returns. The intercept is significant, indicating that in absence of any influence from independent variables, there is a negative baseline stock return. Overall, the model seems to explain around 22.22% of the variation in stock returns, suggesting a moderate level of explanatory power. However, it's important to note that there might be other unaccounted factors influencing stock returns beyond the variables included in the model. Similar to Singapore stock market, the analysis of the Stock Exchange of Thailand (SET) shows that money supply variation, market volatility, liquidity risks, and exchange rate volatility significantly influence stock returns. Higher volatility in these factors tends to lead to increased stock returns, suggesting potential opportunities for investors

during periods of fluctuation. For the Stock Exchange of Thailand (SET), a coefficient of 0.123463 suggests that for every one-percent increase in MSV, stock returns increase by approximately 0.12 percent. Higher MSV typically indicates increased liquidity in the market, which can positively impact stock returns as investors have more capital to invest. With a coefficient of 1.9062, a one- percent increase in market volatility leads to an increase of approximately 1.91 in stock returns. This indicates a positive relationship, which might seem counterintuitive. However, higher market volatility can present more trading opportunities, which may result in higher returns for skilled investors. The coefficient of 0.494909 suggests that a one- percent increase in liquidity risks results in an increase of approximately 0.495 in stock returns. Lower liquidity risks are generally preferred by investors, as they can buy and sell assets more easily. With a coefficient of 1.027940, a one-percent increase in exchange rate volatility leads to an increase of approximately 1.03 in stock returns. This could imply that companies benefiting from exchange rate movements, such as exporters or those with significant foreign investments, might see higher returns during periods of increased volatility. Regarding the effect of volatility on these coefficients, it's important to note that higher volatility in independent variables can lead to larger fluctuations in stock returns. For instance, during periods of high market volatility, stock returns might swing more drastically in response to changes in other variables like money supply variation or exchange rate volatility. This can amplify the effects described by the coefficients. The intercept coefficient of -0.2265 represents the expected stock returns when all independent variables are zero. It serves as the baseline against which the effects of the other variables are measured. Also, p-value all variables show highly significant coefficients ($p < 0.0001$), implying a strong association with stock returns and the R-square model explains around 53.66% of the variation in stock returns, indicating a reasonably good fit.

For the Indonesia Stock Exchange, the coefficient of 1.661245 suggests that, on average, a one- percent t increase in money supply variation is associated with a 1.66 percent increase in stock returns, holding other variables constant. In other words, an increase in money supply variation tends to lead to higher stock returns. This might imply that higher volatility in money supply could lead to more significant fluctuations in stock returns. The coefficient of 0.4087 indicates that, on average, a one- percent increase in market volatility is associated with a 0.4087 percent reduction in stock returns, holding other variables constant. This is somewhat counterintuitive as one would typically expect market volatility to have a negative impact on stock returns. However, it's essential to remember that correlation does not imply causation. This coefficient could suggest that increased market volatility tends to lead to higher uncertainty and risk, influencing investors' decisions and consequently reducing stock returns. With a coefficient of -0.817839, it suggests that, on average, a one-percent rise in liquidity risks is associated with a 0.817839 percent decline in stock returns, holding other variables constant. This implies that higher liquidity risks might lead to changes in investors' behavior that reduces trading volume and ultimately stock returns. The coefficient of 1.24664 indicates that, on average, a one- percent increase in exchange rate volatility is associated with a 1.24664 percent rise in stock returns of the Indonesia Stock Exchange, holding other variables constant. By implication, fluctuations in exchange rates of the Indonesian Rupiah can impact the competitiveness and profitability of companies, influencing stock returns. The R-square explains around 65.21% of the variation in stock returns, indicating a reasonably good fit so.

For the Vietnam Stock Exchange (VNX), the coefficient for MSV is 0.544247. Since the coefficient is positive but insignificant (Prob. = 0.2959), the positive coefficient suggests that an increase in money supply variation is associated with higher stock returns. However, since the coefficient is statistically insignificant, we cannot conclude a significant relationship between money supply variation and stock returns based on this analysis. The coefficient for MV is 1.8809. It is positive and highly significant; the highly significant positive coefficient indicates that an increase in market volatility is strongly associated with higher stock returns. Investors may perceive higher market volatility as an opportunity for potential gains, thus driving up stock returns. The coefficient for LR is 1.087774. It is positive and highly statistically significant; the highly significant positive coefficient suggests that higher liquidity risk is associated with higher stock returns. This implies that investors are willing to accept higher returns for assets with higher liquidity risk, possibly due to higher perceived risk premiums. The coefficient for ERV is 2.037433. It is positive and highly significant (Prob. = 0.0000), the highly significant positive coefficient indicates that higher exchange rate volatility is associated with higher stock returns. Exchange rate volatility can affect the profitability of international trade and foreign investment, influencing stock returns. The intercept coefficient is -132.4825. It is negative and highly significant; the highly significant negative intercept coefficient suggests that stock returns have a negative baseline level. This could be due to various factors such as transaction costs, taxes, or other inherent risks in the market and R-square model explains around 48.34%of the variation in stock returns, indicating a reasonably good fit so, the model as a whole explains a considerable portion of the variation in stock returns, suggesting that these factors collectively are important in understanding stock market dynamics in the Vietnam.

For the Cambodia Securities Exchange (CSX), the coefficient of MSV is 1.012538, with a standard error of 0.002852. This indicates that, on average, a one- percent increase in MSV is associated with a 0.012538 percent increase in stock returns, holding other variables constant. The standard error (0.002852) suggests low volatility or uncertainty around the estimated coefficient which translates to more confidence in the estimate. The coefficient of MV is -0.223439. It is not significant at conventional level given the probability value of 0.4676. Therefore, there is an insignificant association between market volatility and stock returns. In this case, the volatility is represented by the p-value. A higher p-value suggests higher volatility in the relationship estimate, meaning the coefficient might not be reliable for inference. The coefficient of LR is 0.140152, which is significant (probability = 0.0000). It suggests that an increase in liquidity risks is associated with a

0.140152 unit increase in stock returns, on average. Since the p-value is very low (0.0000), indicating significance, there's likely lower volatility around this coefficient estimate compared to MV so, the investors may demand a premium to compensate for bearing liquidity risks. The coefficient of ERV is -0.001494, indicating that a one-percent increase in exchange rate volatility leads to a 0.001494 percent reduction in stock returns, on average. This highlights the importance of considering minimizing currency exchange risk in investment decisions in the Cambodia Securities Exchange. This column shows the p-values associated with each coefficient estimate. A p-value less than the chosen significance level (often 0.05) suggests that the corresponding coefficient is significant. In this case, MSV, LR, and ERV have p-values less than 0.05, indicating significance, while MV does not. The R-squared value is 0.503798, indicating that the independent variables collectively explain about 50.38% of the variability in stock returns. This suggests a moderately good fit of the model.

The analysis for the Lao Securities Exchange (LSX) indicates significant negative association between stock returns and liquidity risks, as well as exchange rate volatility. However, money supply variation and market volatility do not show statistically significant relationships with stock returns. The model explains around 68.11% of the variation in stock returns, suggesting that the included factors are crucial in understanding the Lao Securities Exchange (LSX). For the Philippine Stock Exchange, given that MSV has a coefficient of -0.312142; the negative coefficient suggests that an increase in money supply variation is associated with a decrease in stock returns. This suggests that higher money supply variation tends to lead to lower stock returns, on average. If the volatility of MSV increases, it implies that the market is experiencing more fluctuations and uncertainties. In such conditions, investors may become more risk-averse, leading to a decrease in stock returns. This could amplify the negative effect indicated by the coefficient. A coefficient of -39.48869 suggests that an increase in market volatility is associated with a drop in stock returns. This implies that larger companies (with higher market values) in the Philippines tend to have lower stock returns, on average. If market volatility increases, it could indicate periods of rapid changes in market capitalization, which might affect investor sentiment. Higher volatility in MV could lead to greater uncertainty about the future prospects of the company, potentially exacerbating the negative impact on stock returns suggested by the coefficient. LR had a coefficient of -0.965274. The negative coefficient indicates that an increase in LR is associated with a decline in the conditional quantiles of stock returns. This suggests that companies in the Philippines with higher liquidity risks tend to lesser stock returns, on average. Increased volatility in LR might reflect changes in a Philippines financial structure and risk profile. Higher volatility could lead to greater uncertainty regarding the company's ability in Philippines to meet its financial obligations, potentially dampening the positive impact on stock returns suggested by the coefficient. The ERV has a coefficient of -11.78167. Since the coefficient is negative but statistically significant, the negative coefficient suggesting that an increase in ERV is associated with a decrease in the conditional quantiles of stock returns. This implies that higher exchange rate volatility is associated with lower stock returns, on average. If the volatility of ERV increases, it indicates greater uncertainty about economic conditions. Heightened exchange rate volatility could lead to reduced investor confidence and lower stock returns, potentially reinforcing the negative effect indicated by the coefficient. The intercept term represents the expected value of stock returns when all other explanatory variables are set to zero. In this case, it is 71.47999. The volatility in this context would relate to overall market conditions or factors not explicitly captured by the independent variables. Increased market volatility could lead to greater fluctuations in stock returns around this expected value, making it more challenging to predict or estimate stock returns accurately. Also, The Pseudo R-squared value is 0.629044; indicating 62.9% of the variability in stock returns is explained by the independent variables included in the model. This suggests that the model has a reasonably good fit to the data. In all the panel ARDL estimates, the adjustment coefficients show rapid speed of adjustment of the disequilibrium error in return to long-term value following market volatilities and liquidity risks. The empirical findings align with key principles of the capital asset pricing model (CAPM). Factors like market volatility, liquidity risks, and exchange rate fluctuations significantly impact stock returns globally. Policymakers can tailor interventions to address these risks, potentially stabilizing returns for investors. The variations in money supply significantly affect stock returns, indicating the substantial influence of monetary policy. Central banks can leverage this insight to formulate policies aiming for stable economic growth while minimizing asset price volatility. Exchange rate volatility notably impacts stock returns all the countries, necessitating attention to stabilize exchange rates or improve foreign exchange market mechanisms that could mitigate adverse effects of the instabilities in rate of exchange on stock returns. Liquidity risks negatively impacted stock returns. This calls for policymakers to enhance liquidity through reduced transaction costs, and market-making activities. Mitigating the risk associated with market liquidity can potentially boost stock returns.

Table 9
ARDL short-run results for the Singapore Exchange (SGX)

Stock Returns (SR)			
Variable	Coefficient	t-Statistic	Prob.
dmsv	2.174637	7.5632	0.0000
dmv	-0.66984	-7.2631	0.0000
dlr	-0.30051	-4.7351	0.0000
derv	-1.50416	-15.854	0.0000
c	-110.30780	-13.1026	0.0000
ecm	-0.56900	-20.4782	0.000
R-squared is 0.5620			

Source: Authors results suing Eviews 13

Table 10
ARDL short-run results for Bursa Malaysia Stock Exchange (YSX)

Stock Returns (SR)			
Variable	Coefficient	t-Statistic	Prob.
dmsv	0.645202	5.142925	0.0000
dmv	-72.40712	-6.424482	0.0000
dlr	-0.012447	-0.245032	0.8664
derv	0.308598	2.861904	0.0000
c	-40.94526	-3.361531	0.0000
ecm	0.47109	-5.68968	0.000

R-squared is 0.5314
Source: Authors results suing Eviews 13

Table 11
ARDL short-run results for the Stock Exchange of Thailand (SET)

Stock Returns (SR)			
Variable	Coefficient	t-Statistic	Prob.
dmsv	0.123463	12.06860	0.0000
dmv	-1.9062	-4.6921	0.0000
dlr	-0.494909	-21.2504	0.0000
derv	-1.027940	-10.8731	0.0000
c	-0.2265	-105.0157	0.0000
ecm	-0.62356	-10.2379	0.0000

Pseudo R-squared 0.536628
Source: Authors results suing Eviews 13

Table 12
ARDL short-run results for Indonesia Stock Exchange (ISE)

Stock Returns (SR)			
Variable	Coefficient	t-Statistic	Prob.
dmsv	1.661245	5.3468	0.0000
dmv	-0.40871	-6.3717	0.0000
dlr	-0.81239	-36.3794	0.0000
derv	1.24664	7.5738	0.0000
c	-4.4352	-7.8911	0.0000
ecm	-0.3957	-19.7929	0.0000

R-squared 0.652053
Source: Authors results suing Eviews 13

Table 13
ARDL short-run results for Vietnam Stock Exchange (VNX)

Stock Returns (SR)			
Variable	Coefficient	t-Statistic	Prob.
dmsv	0.544247	1.047184	0.2959
dmv	-1.880965	-5.875162	0.0000
dlr	-1.087774	-7.316055	0.0000
derv	-2.037433	-9.726169	0.0000
c	-1.4825	-5.149401	0.0000
ecm	-0.79368	-13.4979	0.0000

R-squared 0.483414
Source: Authors results suing Eviews 13

Table 14
ARDL short-run results for the Cambodia Securities Exchange (CSX)

Stock Returns (SR)			
Variable	Coefficient	t-Statistic	Prob.
dmsv	1.012538	4.396784	0.0000
dmv	-0.223439	-0.727364	0.4676
dlr	-0.140152	-45.59232	0.0000
derv	-0.001494	-8.715974	0.0000
c	-0.767917	-4.793412	0.0000
ecm	-0.669178	-34.02738	0.0000

R-squared is 0.503798
Source: Authors results suing Eviews 13

Table 15
ARDL short-run results for the Lao Securities Exchange (LSX)

Stock Returns (SR)			
Variable	Coefficient	t-Statistic	Prob.
dmsv	0.002734	1.49677	0.1364
dmv	-0.108082	-0.3249	0.7055
dlr	-0.054427	-16.8053	0.0000
derv	-0.251520	-61.0181	0.0000
c	-0.271505	-1.68129	0.0925
ecm	-0.827819	-16.3349	0.0000

R-squared is 0.681117
Source: Authors results suing Eviews 13

Table 16
ARDL short-run results for the Philippine Securities Exchange (LSX)

Stock Returns (SR)			
Variable	Coefficient	t-Statistic	Prob.
dmsv	-0.31242	-1.7053	0.0892
dmv	-39.4869	-3.9034	0.0001
dlr	-0.96574	-35.519	0.0000
derv	-11.7167	-5.7552	0.0000
c	71.4799	6.4187	0.0000
ecm	-0.92300	-10.0983	0.0000

R-squared is 0.629044
Source: Authors results suing Eviews 13

5. Conclusion

First and foremost, we investigated the trend of stock market volatility in 8 emerging stock exchange namely, the Singapore Exchange (SGX), Bursa Malaysia Stock Exchange (YSX), the Stock Exchange of Thailand (SET), Indonesia Stock Exchange, the Vietnam Stock Exchange (VNX), the Cambodia Securities Exchange (CSX), the Lao Securities Exchange (LSX), and the Philippine Stock Exchange. Secondly, we estimated the causal impact of liquidity risk on stock returns while controlling for money supply, inflation etc. The FIGARCH-DCC model was analyzed. The study found long memory property in the conditional variance of returns for all markets considered in the study in the above stock exchanges. In view of that, the results obtained from the study provide valuable insights for investors and policymakers, emphasizing the importance of considering both global trends and local market conditions when making investment decisions. The government should focus on developing robust risk management strategies. This includes implementing measures to mitigate market volatility through regulatory interventions, enhancing liquidity in the financial markets, and promoting investor education and awareness about the risks associated with volatile markets. The government should prioritize initiatives aimed at enhancing market stability to minimize the adverse effects of volatility on stock returns. This may involve implementing measures to improve market transparency, strengthen regulatory oversight, and foster investor confidence. By creating a more stable and predictable investment environment, policymakers can help mitigate the negative impact of market volatility on stock returns. The government should implement measures to address currency risk and mitigate its impact on stock returns. This may include adopting policies to stabilize exchange rates, enhancing foreign exchange market liquidity, and promoting diversification strategies to hedge against currency risk. The government should prioritize initiatives aimed at promoting market efficiency to ensure that stock prices accurately reflect all existing information. This includes enhancing market transparency, reducing information asymmetries, and fostering competition among market participants. By promoting market efficiency, policymakers can help minimize the adverse impact of liquidity risk and exchange rate volatility on stock returns. The government should support diversification efforts by promoting access to a diverse range of investment opportunities, encouraging and facilitating cross-border capital flows. In sum, through targeted policies promoting market efficiency, managing monetary dynamics, stabilizing exchange rates, enhancing liquidity, policymakers can foster sustainable stock market growth and development.

The study comprehensively analyzed the impact of various factors, including money supply variation, market volatility, liquidity risks, and exchange rate volatility, on stock returns across several countries. By employing FIGARCH-DCC regression modeling and estimation, the study aimed to provide a more robust understanding of stock market dynamics. The findings reveal nuanced relationships between these variables and stock returns across different countries. While market volatility and exchange rate volatility consistently showed significant positive influences on stock returns in most countries, the effects of others such as money supply variation and liquidity risks varied. Additionally, the models employed in the study explained a substantial portion of the variation in stock returns. Overall, the study contributes to the literature by offering insights into the complex interactions shaping stock market performance in diverse economic contexts with the most recent data. The results underscore the need for policymakers and investors to consider a range of factors beyond traditional metrics when assessing market dynamics and making investment decisions. Further research could delve deeper into specific country contexts or explore additional variables to enhance our understanding of stock market behavior.

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Appendix A1: Descriptive statistics for the Singapore Exchange (SGX)

Statistics	msv	mv	lr	erv	sr
Mean	14.59473	0.573176	65.92056	2.980808	40.44104
Median	14.05563	0.591106	69.06820	2.701604	32.29806
Std. Dev.	5.584328	0.162902	23.51934	1.141477	28.91928
Skewness	1.360939	0.024316	-0.063314	0.892418	1.428608
Kurtosis	6.631004	2.046619	1.847820	2.617412	4.067431
Jarque-Bera	236.8173	10.47995	15.45086	38.31811	106.9856
Probability	0.000000	0.005300	0.000441	0.000000	0.000000
Observations	276	276	276	276	276

Source: Authors' results suing Eviews 13

Appendix A2: Descriptive Statistics for Bursa Malaysia Stock Exchange (YSX)

Statistics	msv	mv	lr	erv	sr
Mean	21.25675	0.436090	76.83868	43.64736	24.21349
Median	18.72521	0.413600	55.60584	31.54442	18.52518
Std. Dev.	11.13861	0.107351	51.93454	18.38475	22.01949
Skewness	0.226844	0.382048	0.843644	0.555714	2.002772
Kurtosis	2.300807	2.156083	2.387916	1.487517	6.493132
Jarque-Bera	8.336438	15.55247	38.65903	42.27455	338.9562
Probability	0.015480	0.000420	0.000000	0.000000	0.000000
Observations	288	288	288	288	288

Source: Authors' results suing Eviews 13

Appendix A3: Descriptive Statistics for the Stock Exchange of Thailand (SET)

Statistics	msv	mv	lr	erv	sr
Mean	14.00514	0.275961	81.41952	56.77964	58.68436
Median	13.67708	0.289785	73.05170	51.02378	52.14237
Std. Dev.	4.067378	0.036403	42.54429	12.49279	21.07544
Skewness	0.394982	-0.768700	1.932344	0.457402	0.616323
Kurtosis	2.281545	2.304484	6.714738	1.706754	2.386459
Jarque-Bera	13.68266	34.16808	344.8211	30.11222	22.75021
Probability	0.001069	0.000000	0.000000	0.000000	0.000011
Observations	288	288	288	288	288

Source: Authors' results suing Eviews 13

Appendix A4: Descriptive Statistics for Indonesia Stock Exchange (ISE)

Statistics	msv	mv	lr	erv	sr
Mean	14.38982	0.500433	189.6776	7.128845	121.7432
Median	13.91988	0.554794	198.4356	6.866092	104.1156
Std. Dev.	4.753431	0.121178	94.41225	0.766443	85.63647
Skewness	0.924538	-0.365772	0.904426	0.500142	0.862395
Kurtosis	4.152830	1.430856	4.549823	1.697620	3.273333
Jarque-Bera	56.97716	35.96841	68.08672	32.36115	36.59533
Probability	0.000000	0.000000	0.000000	0.000000	0.000000
Observations	288	288	288	288	288

Source: Authors' results suing Eviews 13

Appendix A5: Descriptive Statistics for the Vietnam Stock Exchange (VNX)

Statistics	msv	mv	lr	erv	sr
Mean	10.81116	0.489448	27.52245	10.50646	66.19978
Median	8.489505	0.487951	26.25466	9.132118	65.20804
Std. Dev.	6.097238	0.083990	5.887379	3.479872	25.92595
Skewness	0.817146	-0.044031	0.569138	0.413502	0.372869
Kurtosis	2.474132	2.854231	2.884819	1.618320	2.494283
Jarque-Bera	35.36934	0.348044	15.70725	31.11571	9.742508
Probability	0.000000	0.000278	0.000388	0.000000	0.007664

Observations	288	288	288	288	288

Source: Authors' results suing Eviews 13

Appendix A6: Descriptive Statistics for the Cambodia Securities Exchange (CSX)

Statistics	msv	mv	lr	erv	sr
Mean	21.79349	0.404382	9.287960	209.9781	1.267336
Median	18.13056	0.405836	8.494085	155.5871	0.888037
Std. Dev.	18.21588	0.105703	6.589863	109.7211	1.373373
Skewness	1.956044	-0.066162	2.439491	1.010091	2.692776
Kurtosis	7.739919	2.192013	9.961027	2.595417	9.365593
Jarque-Bera	453.2553	8.044221	867.1244	50.93790	834.2992
Probability	0.000000	0.017915	0.000000	0.000000	0.000000
Observations	288	288	288	288	288

Source: Authors' results suing Eviews 13

Appendix A7: Descriptive Statistics for the Lao Securities Exchange (LSX)

Statistics	msv	mv	lr	erv	sr
Mean	30.07316	0.371518	4.915608	2.890400	0.791437
Median	27.81816	0.389144	4.359990	1.672746	0.615803
Std. Dev.	10.47438	0.062361	3.166072	2.445997	0.595071
Skewness	0.918059	-0.716613	1.397859	1.114113	0.831938
Kurtosis	3.424908	2.633229	5.443913	3.287570	2.570059
Jarque-Bera	42.62253	26.26389	165.4651	60.57220	35.43997
Probability	0.000000	0.000002	0.000000	0.000000	0.000000
Observations	288	288	288	288	288

Source: Authors' results suing Eviews 13

Appendix A8: Descriptive Statistics for the Philippine Stock Exchange (PSE)

Statistics	msv	mv	lr	erv	sr
Mean	7.419314	0.382740	37.00055	3.761392	46.35337
Median	7.542712	0.383216	29.59408	3.800000	42.34853
Std. Dev.	3.464469	0.052918	16.66671	0.414446	16.84139
Skewness	0.363856	0.249410	1.502522	-0.150986	0.947722
Kurtosis	2.248614	2.122679	4.400896	1.929048	2.810266
Jarque-Bera	13.12974	12.22217	131.9136	14.85752	43.54450
Probability	0.001409	0.002218	0.000000	0.000594	0.000000
Observations	288	288	288	288	288

Source: Authors' results suing Eviews 13

Appendix 2: Unit root test results

Appendix B1: Unit root results for the Singapore Exchange (SGX)

Variables	Critical Values 5%	ADF T-Statistic	Order of Stationary	Remark
msv	-2.872370	-3.706009	i(1)	stationary
mv	-2.872370	-2.984638	i(1)	stationary
lr	-2.872370	-3.583693	i(1)	stationary
erv	-2.872370	-2.901849	i(1)	stationary
sr	-2.872370	-3.994892	i(1)	stationary

Source: Authors' results suing Eviews 13

Appendix B2: Unit Root Results for the Bursa Malaysia Stock Exchange (YSX)

Variables	Critical Values 5%	ADF T-Statistic	Order of Stationary	Remark
msv	-2.871402	-16.85289	I(1)	Stationary
mv	-2.871402	-16.86718	I(1)	Stationary
lr	-2.871402	-17.12672	I(1)	Stationary
erv	-2.871402	-16.99175	I(1)	Stationary
sr	-2.871402	-16.85718	I(1)	Stationary

Source: Authors' results suing Eviews 13

Appendix B3: Unit Root Results for the Stock Exchange of Thailand (SET)

Variables	Critical Values 5%	ADF T-Statistic	Order of Stationary	Remark
msv	-2.871402	-16.86515	I(1)	Stationary
mv	-2.871402	-16.90339	I(1)	Stationary
lr	-2.871402	-16.90906	I(1)	Stationary
erv	-2.871402	-17.18894	I(1)	Stationary
sr	-2.871402	-16.85716	I(1)	Stationary

Source: Authors' results suing Eviews 13

Appendix B4: Unit Root Results for the Indonesia Stock Exchange (ISE)

Variables	Critical Values 5%	ADF T-Statistic	Order of Stationary	Remark
msv	-2.871402	-16.85286	I(1)	Stationary
mv	-2.871402	-17.10044	I(1)	Stationary
lr	-2.871402	-16.175893	I(1)	Stationary
erv	-2.871402	-16.91670	I(1)	Stationary
sr	-2.871402	-16.86820	I(1)	Stationary

Source: Authors' results suing Eviews 13

Appendix B5: Unit Root Results for the Vietnam Stock Exchange (VNX)

Variables	Critical Values 5%	ADF T-Statistic	Order of Stationary	Remark
msv	-2.871438	-16.85409	I(1)	Stationary
mv	-2.871438	-16.85402	I(1)	Stationary
lr	-2.871438	-16.86642	I(1)	Stationary
erv	-2.871438	-16.95588	I(1)	Stationary
sr	-2.871438	-16.88143	I(1)	Stationary

Source: Authors' results suing Eviews 13

Appendix B6. Unit Root Results for the Cambodia Securities Exchange (CSX)

Variables	Critical Values 5%	ADF T-Statistic	Order of Stationary	Remark
msv	-2.871438	-16.85722	I(1)	Stationary
mv	-2.871438	-16.86733	I(1)	Stationary
lr	-2.871438	-16.85637	I(1)	Stationary
erv	-2.871438	-3.596653	I(1)	Stationary
sr	-2.871438	-16.85234	I(1)	Stationary

Source: Authors' results suing Eviews 13

Appendix B7: Unit Root Results for the Lao Securities Exchange (LSX)

Variables	Critical Values 5%	ADF T-Statistic	Order of Stationary	Remark
msv	-2.871438	-16.86712	I(1)	Stationary
mv	-2.871438	-16.86685	I(1)	Stationary
lr	-2.871438	-16.85230	I(1)	Stationary
erv	-2.871438	-3.184102	I(1)	Stationary
sr	-2.871438	-16.96531	I(1)	Stationary

Source: Authors' results suing Eviews 13

Appendix B8: Unit Root results for the Philippine Stock Exchange (PSE)

Variables	Critical Values 5%	ADF T-Statistic	Order of Stationary	Remark
msv	-2.871438	-8.029389	I(1)	Stationary
mv	-2.871438	-16.85867	I(1)	Stationary
lr	-2.871438	-16.88304	I(1)	Stationary
erv	-2.871438	-16.88004	I(1)	Stationary
sr	-2.871438	-16.85840	I(1)	Stationary

Source: Authors' results suing Eviews 13

Appendix 3: Co-integration results

Appendix C1: Co-integration Results for the Singapore Exchange (SGX)

Maximum Eigenvalue Results				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.159683	47.14756	33.87687	0.0008
At most 1 *	0.104068	29.78039	27.58434	0.0257
At most 2	0.043869	12.15725	21.13162	0.5322
At most 3	0.025215	6.920815	14.26460	0.4986
At most 4	0.000394	0.106857	3.841466	0.7437
Max-eigenvalue test indicates 2 co-integrating eqn(s) at the 0.05 level				

Source: Authors' results suing Eviews 13

Appendix C2: Co-integration Results for the Bursa Malaysia Stock Exchange (YSX)

Maximum Eigenvalue Results				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.090995	46.99956	33.87687	0.2634
At most 1	0.044879	32.99458	27.58434	0.8852
At most 2	0.028754	8.256542	21.13162	0.8873
At most 3	0.017286	4.934719	14.26460	0.7501
At most 4	0.008352	2.373587	3.841466	0.1234
Max-eigenvalue test indicates 2 co-integrating relations at the 0.05 level				

Source: Authors' results suing Eviews 13

Appendix C3: Co-integration Results for the Stock Exchange of Thailand (SET)

Maximum Eigenvalue Results				
Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.111048	78.87369	69.81889	0.0079
At most 1	0.077767	45.56104	47.85613	0.0809
At most 2	0.052860	22.65025	29.79707	0.2637
At most 3	0.024143	7.281124	15.49471	0.5452
At most 4	0.001288	0.364703	3.841466	0.5459
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				

Source: Authors' results suing Eviews 13

Appendix C4: Co-Integration Results for the Indonesia Stock Exchange (ISE)

Maximum Eigenvalue Results				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.081604	54.09098	33.87687	0.4489
At most 1	0.067913	29.90312	27.58434	0.3479
At most 2	0.033610	9.675272	21.13162	0.7745
At most 3	0.015370	4.383383	14.26460	0.8168
At most 4	0.010377	2.952143	3.841466	0.0858
Max-eigenvalue test indicates 2 co-integrating relations at the 0.05 level				

Source: Authors results suing Eviews 13

Appendix C5: Co-integration Results for the Vietnam Stock Exchange (VNX)

Maximum Eigenvalue Test Results				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.076743	62.59678	33.87687	0.5614
At most 1	0.064616	48.90399	27.58434	0.4219
At most 2	0.029921	8.596933	21.13162	0.8635
At most 3	0.012095	3.443741	14.26460	0.9129
At most 4	0.006272	1.780610	3.841466	0.1821
Max-eigenvalue test indicates 2 co-integrating relations at the 0.05 level				

Source: Authors results suing Eviews 13

Appendix C6: Co-integration Results for the Cambodia Securities Exchange (CSX)

Maximum Eigenvalue Test Results				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.105273	41.48002	33.87687	0.0941
At most 1	0.060785	37.74707	27.58434	0.5163
At most 2	0.032949	9.481777	21.13162	0.7918
At most 3	0.015931	4.544717	14.26460	0.7978
At most 4	0.004022	1.140430	3.841466	0.2856
Max-eigenvalue test indicates 1 co-integration at the 0.05 level				

Source: Authors results suing Eviews 13

Appendix C7: Co-integration Results for the Lao Securities Exchange (LSX)

Maximum Eigenvalue				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.064058	48.73507	33.87687	0.8377
At most 1	0.034658	9.982262	27.58434	0.9852
At most 2	0.031935	9.185186	21.13162	0.8172
At most 3	0.025282	7.246665	14.26460	0.4604
At most 4	0.009930	2.824161	3.841466	0.0929
Max-eigenvalue test indicates 1 co-integration at the 0.05 level				

Source: Authors results suing Eviews 13

Appendix C8: Co-integration Results for the Philippine Stock Exchange (PSE)

Maximum Eigenvalue				
Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None	0.102519	50.61033	33.87687	0.1169
At most 1	0.069550	20.40050	27.58434	0.3141
At most 2	0.033131	9.534832	21.13162	0.7871
At most 3	0.016996	4.851321	14.26460	0.7605
At most 4	0.003510	0.995159	3.841466	0.3185
Max-eigenvalue test indicates 1 co-integration at the 0.05 level				

Source: Authors results suing Eviews 13

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